January 2024

Annex 1 to the Technical Regulation 3.3.1 for Energy Storage Facilities

Energy Storage Facilities Type A

Version 1.0

Version log

|  |  |  |
| --- | --- | --- |
| **Version** | **Change** | **Date** |
| 1.0 | Created as a translated version of the Danish version “Bilag B1.1-1.2 - A energilageranlæg”. | 05-02-2024 |

Table of Contents

[Version log 2](#_Toc160440017)

[Table of Contents 3](#_Toc160440018)

[B1.1. Documentation for Energy Storage Facilities Type A 4](#_Toc160440019)

[B1.2. Documentation for Energy Storage Facilities Type A 7](#_Toc160440020)

Documentation – Type A

* 1. Documentation for Energy Storage Facilities Type A

Please complete the documentation with energy storage facility data and send it to the DSO.

* + 1. Identification

|  |  |
| --- | --- |
| Energy storage facility: | Description of the facility: |
| Global Service Relation Number (GSRN-nummer): |  |
| Facility owner name and address: |  |
| Facility owner telephone number: |  |
| Facility owner e-mail address: |  |
| Inverter – manufacturer: |  |
| Inverter – model: |  |
| Inverter – rated power: |  |
| Inverter – number of phases: |  |
| Storage medium – manufacturer: |  |
| Storage medium – model.: |  |
| Storage medium – usable energy storage capacity [kWh] |  |

* + 1. Positive list

|  |  |
| --- | --- |
| Is the energy storage facility included on the positive list?  If not, please fill out annex B1.2 as well. | Yes  No |

* + 1. Automatic connection and reconnection

|  |  |
| --- | --- |
| Is automatic connection and reconnection enabled?  If yes, what are the setting values? | Yes  No  Voltage range:  \_\_\_\_\_\_ V to \_\_\_\_\_V  Frequency range:  \_\_\_\_\_Hz to \_\_\_\_\_Hz  Observation time:  \_\_\_\_\_\_\_\_\_\_\_\_ min  Gradient:  \_\_\_\_\_\_\_\_\_\_\_\_\_ %/s |

* + 1. Power response to overfrequency

|  |  |
| --- | --- |
| Is the frequency response function for overfrequency enabled?  If yes, what are the setting values?  Frequency threshold (fRO):  Droop:  Delay for islanding detection (minimum response time): | Yes  No  \_\_\_\_\_\_\_\_ Hz  \_\_\_\_\_\_\_\_ %  \_\_\_\_\_\_\_\_ ms |

* + 1. Reactive power

|  |  |
| --- | --- |
| What does the facility produce in reactive power? | \_\_\_\_\_\_\_\_ cosφ  Inductive  Capacitive |

* + 1. Protection
       1. Relay settings

Please state the actual values at the time of commissioning in the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Protection function** | **Symbol** | **Setting** | | **Trip time** | |
| Overvoltage (step 2) | U>> |  | V |  | ms |
| Overvoltage (step 1) | U> |  | V |  | s |
| Undervoltage (step 1) | U< |  | V |  | s |
| Undervoltage (step 2)\* | U<< |  | V |  | ms |
| Overfrequency | *f>* |  | Hz |  | ms |
| Underfrequency | *f<* |  | Hz |  | ms |
| Frequency change\* | df/dt |  | Hz/s |  | ms |

\*At least one of these functions must be enabled.

* + 1. Signature

|  |  |
| --- | --- |
| Date of commissioning: |  |
| Contractor: |  |
| Responsible: |  |
| Signature (Responsible): |  |
| Facility owner: |  |
| Signature (Facility owner): |  |

* 1. Documentation for Energy Storage Facilities Type A

Please complete the documentation with energy storage facility data to have the inverter added to the Positive List or if the inverter is not on the Positive List (in this case send it to the DSO).

* + 1. Identification

|  |  |
| --- | --- |
| Energy storage facility: | Description of the energy storage facility: |
| Facility owner name and address: |  |
| Facility owner telephone number |  |
| Facility owner e-mail address: |  |
| Inverter – manufacturer: |  |
| Inverter – model: |  |
| Inverter – rated power: |  |
| Inverter – number of phases: |  |
| Storage medium – manufacturer: |  |
| Storage medium – model: |  |
| Storage medium – usable energy storage capacity kWh] |  |

* + 1. Normal operation

|  |  |
| --- | --- |
| Can the facility start up and operate continuously within the normal operation range, only restricted by protective settings, c.f. the requirements in chapter 2 §5 and §6?  If yes, please provide reference to documentation: | Yes  No |

* + 1. Automatic connection and reconnection

|  |  |
| --- | --- |
| Does automatic connection and reconnection of the facility only occur three minutes after the voltage and frequency are within the required areas and following the gradient specified in chapter 2 §7 and §8 respectively?  If yes, please provide reference to documentation: | Yes  No |

* + 1. Phase jump

|  |  |
| --- | --- |
| Does the energy storage facility remain connected during voltage phase jumps of 20 degrees at the POC as specified in chapter 2 §10?  If yes, please provide reference to documentation: | Yes  No |

* + 1. Tolerance of frequency deviations

|  |  |
| --- | --- |
| Does the energy storage facility remain connected in case of frequency changes of 2.0 Hz/s at the POC?  If yes, please provide reference to documentation: | Yes  No |

* + 1. Permitted reduction of active power during underfrequency

|  |  |
| --- | --- |
| Is the active power reduction at underfrequency less than the limit specified in chapter 2 §12?  If yes, please provide reference to documentation: | Yes  No |

* + 1. Power Quality

For each power quality parameter, please specify how the result was obtained.

* + - 1. DC content

|  |  |
| --- | --- |
| Does the DC content during normal operation exceed 0.5% of the nominal current as specified in chapter 2 §14?  If no, please provide reference to documentation: | Yes  No |

* + - 1. Current unbalance

|  |  |
| --- | --- |
| Does the current unbalance during normal operation exceed 16 A as specified in chapter 2 §15?  If no, please provide reference to documentation: | Yes  No |
| Have steps been taken to ensure that the above limit is not exceeded if the energy storage facility consists of single-phase energy storage units?  If yes, please provide reference to documentation: | Yes  No |

* + - 1. Rapid voltage changes

|  |  |
| --- | --- |
| Does the power-generating plant comply with the limit value for rapid voltage changes specified in chapter 2 §16?  If yes, please provide reference to documentation: | Yes  No |

* + - 1. Flicker

|  |  |
| --- | --- |
| Is the flicker contribution for the entire energy storage facility below the limit value specified in chapter 2 §17?  If yes, please provide reference to documentation: | Yes  No |

* + - 1. Harmonic overtones

|  |  |
| --- | --- |
| Are all the harmonic overtones for the entire energy storage facility below the limit values specified in chapter2 §18?  If yes, please provide reference to documentation: | Yes  No |

* + - 1. Interharmonic overtones

Please only complete this section for energy storage facilities above 50 kW.

|  |  |
| --- | --- |
| Are all the interharmonic overtones for the entire energy storage facility below the limit values specified in chapter 2 §19?  If yes, please provide reference to documentation: | Yes  No |

* + - 1. Disturbances in the 2-9kHz frequency range

Please only complete this section for energy storage facilities above 50 kW.

|  |  |
| --- | --- |
| Are emissions of distortions in the 2-9 kHz frequency range less than 0.2% of the rated current In as required in chapter 2 §20?  If yes, please provide reference to documentation: | Yes  No |

* + 1. Active power control
       1. Power response to overfrequency (LFSM-O)

|  |  |
| --- | --- |
| Is the energy storage facility equipped with a frequency response function for overfrequency as specified in chapter 2 §23?  If yes, please provide reference to documentation: | Yes  No |

* + - 1. Absolute power constraint

|  |  |
| --- | --- |
| Is the energy storage facility equipped with an absolute power constraint function as specified in chapter 2 §9?  If yes, please provide reference to documentation: | Yes  No |

* + 1. Reactive power
       1. Work area

|  |  |
| --- | --- |
| Can the energy storage facility operate in the entire reactive work area specified in chapter 7 §83 or in chapter 12 §108 for synchronous- and non-synchronous energy storage facilities respectively?  If yes, please provide reference to documentation: | Yes  No |

* + 1. Protection

The protection settings must be equipped with protection settings as is specified in chapter 2 §24 and §25.

* + - 1. Relay settings

Please state default relay setting values in the table below.

*If the default values deviate from those specified in chapter 2 §25, please include documentation showing that the relay settings can be adjusted to the correct values during commissioning.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***Protection function*** | ***Symbol*** | ***Setting*** | | ***Trip time*** | |
| *Overvoltage (step 2)* | U>> |  | V |  | ms |
| *Overvoltage (step 1)* | U> |  | V |  | s |
| *Undervoltage (step 1)* | U< |  | V |  | s |
| *Undervoltage (step 2)* | U<< |  | V |  | ms |
| *Overfrequency* | f> |  | Hz |  | ms |
| *Underfrequency* | f< |  | Hz |  | ms |
| *Frequency change* | df/dt |  | Hz/s |  | ms |
| *Please provide reference to documentation showing that the above setting values are true and can be set in the energy storage facility:* | | | | | |

* + 1. Signature

This section must always be filled out.

|  |  |
| --- | --- |
| Date: |  |
| Company: |  |
| Person responsible for commissioning: |  |
| Signature (person responsible for commissioning): |  |
| Facility owner: |  |
| Signature (facility owner): |  |